What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. An electric rotary machine including a rotor having a field magnet provided on a shaft, said field magnet comprising:

a first field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction;

a second field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction; and

wherein said second field magnet is rotatable on said shaft and displaced axially with respect to said first field magnet.

2. The electric rotary machine of claim 1 wherein a composite magnetic field created by said field magnets is changed.

3. The electric rotary machine of claim 1 wherein said shaft has a screw part and said second field magnet has a nut part provided on an inner peripheral side thereof.

4. The electric rotary machine of claim 1 further comprising a stopper provided on said shaft at a predetermined distance away from said second field magnet.

5. The electric rotary machine of claim 4 further comprising an actuator to vary said distance.

6. The electric rotary machine of claim 1 wherein an axial displacement amount of said second field magnet is detected and an advance of a current supply by a controller for controlling a converter is corrected utilizing said displacement amount.

7. The electric rotary machine of claim 1 further comprising a plurality of support mechanism for guiding rotational motion, reciprocating motion and composite motion.

8. The electric rotary machine of claim 1 wherein a sleeve is secured between an inner peripheral side of said second field magnet and the shaft.

9. The electric rotary machine of claim 8 wherein said sleeve is formed of a non-magnetic material having an electrical resistivity at least higher than that of iron.

10. The electric rotary machine of claim 1 wherein said second field magnet is provided with a protrusion part and said first field magnet is provided with a recess part for receiving said protrusion part.

11. The electric rotary machine of claim 1 wherein an air gap between the rotor having said second field magnet and a stator is greater than that between the rotor having said first field magnet and said stator.

12. An electric rotary machine including a rotor having a field magnet provided on a shaft, said field magnet comprising:

a first field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction;

a second field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction; and

wherein said second field magnet is rotatable on said shaft and displaced axially with respect to said first field magnet and a composite magnetic field created by said field magnets is changed.

13. The electric rotary machine of claim 12 wherein said shaft has a screw part and said second field magnet has a nut part provided on an inner peripheral side thereof.

14. The electric rotary machine of claim 12 further comprising a stopper provided on said shaft at a predetermined distance away from said second field magnet.

15. The electric rotary machine of claim 14 further comprising an actuator to vary said distance.

16. The electric rotary machine of claim 12 wherein an axial displacement amount of said second field magnet is detected and an advance of a current supply by a controller for controlling a converter is corrected utilizing said displacement amount.

17. The electric rotary machine of claim 12 further comprising a plurality of support mechanism for guiding rotational motion, reciprocating motion and composite motion.

18. The electric rotary machine of claim 12 wherein a sleeve is secured between an inner peripheral side of said second field magnet and the shaft.

19. The electric rotary machine of claim 18 wherein said sleeve is formed of a non-magnetic material having an electrical resistivity at least higher than that of iron.

20. The electric rotary machine of claim 12 wherein said second field magnet is provided with a protrusion part and said first field magnet is provided with a recess part for receiving said protrusion part.

21. The electric rotary machine of claim 12 wherein an air gap between the rotor having said second field magnet and a stator is greater than that between the rotor having said first field magnet and said stator.

22. An electric rotary machine including a rotor having a field magnet provided on a shaft, said field magnet comprising:

a first field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction;

a second field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction; and

wherein said second field magnet is rotatable on said shaft and displaced axially with respect to said first field magnet and a mechanism for changing the composite magnetic field created is based on the direction of a torque of said with means for aligning the same magnetic poles of said first field magnet and said second field magnet on their center axes by balancing the direction of said torque generated.

23. A power generation system comprising an electric rotary machine including a rotor having a field magnet provided on a shaft, said field magnet comprising:

a power converter for controlling power of said electric rotary machine;

a heat engine;

a first field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction;

a second field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction; and

wherein said second field magnet is rotatable on said shaft and displaced axially with respect to said first field magnet.

24. The power generation system of claim 23 wherein a composite magnetic field created by said field magnets is changed.

25. The power generation system of claim 23 wherein said shaft has a screw part and said second field magnet has a nut part provided on an inner peripheral side thereof.

26. The power generation system of claim 23 further comprising a stopper provided on said shaft at a predetermined distance away from said second field magnet.

27. The power generation system of claim 26 further comprising an actuator to vary said distance.

28. The power generation system of claim 23 wherein an axial displacement amount of said second field magnet is detected and an advance of a current supply by a controller for controlling a converter is corrected utilizing said displacement amount.

29. The power generation system of claim 23 further comprising a plurality of support mechanism for guiding rotational motion, reciprocating motion and composite motion.

30. The power generation system of claim 23 wherein a sleeve is secured between an inner peripheral side of said second field magnet and the shaft.

31. The power generation system of claim 30 wherein said sleeve is formed of a non-magnetic material having an electrical resistivity at least higher than that of iron.

32. The power generation system of claim 23 wherein said second field magnet is provided with a protrusion part and said first field magnet is provided with a recess part for receiving said protrusion part.

33. The power generation system of claim 23 wherein an air gap between the rotor having said second field magnet and a stator is greater than that between the rotor having said first field magnet and said stator.

34. A power generation system comprising an electric rotary machine including a rotor having a field magnet provided on a shaft, said field magnet comprising:

a power converter for controlling power of said electric rotary machine;

a heat engine;

a first field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction;

a second field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction; and

wherein said second field magnet is rotatable on said shaft and displaced axially with respect to said first field magnet and a composite magnetic field created by said field magnets is changed.

35. The power generation system of claim 34 wherein said shaft has a screw part and said second field magnet has a nut part provided on an inner peripheral side thereof.

36. The power generation system of claim 34 further comprising a stopper provided on said shaft at a predetermined distance away from said second field magnet.

37. The power generation system of claim 36 further comprising an actuator to vary said distance.

38. The power generation system of claim 34 wherein an axial displacement amount of said second field magnet is detected and an advance of a current supply by a controller for controlling a converter is corrected utilizing said displacement amount.

39. The power generation system of claim 34 further comprising a plurality of support mechanism for guiding rotational motion, reciprocating motion and composite motion.

40. The power generation system of claim 34 wherein a sleeve is secured between an inner peripheral side of said second field magnet and the shaft.

41. The power generation system of claim 40 wherein said sleeve is formed of a non-magnetic material having an electrical resistivity at least higher than that of iron.

42. The power generation system of claim 34 wherein said second field magnet is provided with a protrusion part and said first field magnet is provided with a recess part for receiving said protrusion part.

43. The power generation system of claim 34 wherein an air gap between the rotor having said second field magnet and a stator is greater than that between the rotor having said first field magnet and said stator.

44. A turbine power generation system comprising an electric rotary machine including a rotor having a field magnet provided on a shaft, said field magnet comprising:

a power converter for controlling power of said electric rotary machine;

a heat engine;

a compressor;

a turbine;

a combustor;

a first field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction;

a second field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction; and

wherein said second field magnet is rotatable on said shaft and displaced axially with respect to said first field magnet.

45. The power generation system of claim 44 wherein a composite magnetic field created by said field magnets is changed.

46. The turbine power generation system of claim 44 wherein said shaft has a screw part and said second field magnet has a nut part provided on an inner peripheral side thereof.

47. The turbine power generation system of claim 44 further comprising a stopper provided on said shaft at a predetermined distance away from said second field magnet.

48. The turbine power generation system of claim 47 further comprising an actuator to vary said distance.

49. The turbine power generation system of claim 44 wherein an axial displacement amount of said second field magnet is detected and an advance of a current supply by a controller for controlling a converter is corrected utilizing said displacement amount.

50. The turbine power generation system of claim 44 further comprising a plurality of support mechanism for guiding rotational motion, reciprocating motion and composite motion.

51. The turbine power generation system of claim 44 wherein a sleeve is secured between an inner peripheral side of said second field magnet and the shaft.

52. The turbine power generation system of claim 51 wherein said sleeve is formed of a non-magnetic material having an electrical resistivity at least higher than that of iron.

53. The turbine power generation system of claim 44 wherein said second field magnet is provided with a protrusion part and said first field magnet is provided with a recess part for receiving said protrusion part.

54. The turbine power generation system of claim 44 wherein an air gap between the rotor having said second field magnet and a stator is greater than that between the rotor having said first field magnet and said stator.

55. A turbine power generation system comprising an electric rotary machine including a rotor having a field magnet provided on a shaft, said field magnet comprising:

a power converter for controlling power of said electric rotary machine;

a heat engine;

a compressor;

a turbine;

a combustor;

a first field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction;

a second field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction; and

wherein said second field magnet is rotatable on said shaft and displaced axially with respect to said first field magnet and a composite magnetic field created by said field magnets is changed.

56. The turbine power generation system of claim 55 wherein said shaft has a screw part and said second field magnet has a nut part provided on an inner peripheral side thereof.

57. The turbine power generation system of claim 55 further comprising a stopper provided on said shaft at a predetermined distance away from said second field magnet.

58. The turbine power generation system of claim 57 further comprising an actuator to vary said distance.

59. The turbine power generation system of claim 55 wherein an axial displacement amount of said second field magnet is detected and an advance of a current supply by a controller for controlling a converter is corrected utilizing said displacement amount.

60. The turbine power generation system of claim 55 further comprising a plurality of support mechanism for guiding rotational motion, reciprocating motion and composite motion.

61. The turbine power generation system of claim 55 wherein a sleeve is secured between an inner peripheral side of said second field magnet and the shaft.

62. The turbine power generation system of claim 61 wherein said sleeve is formed of a non-magnetic material having an electrical resistivity at least higher than that of iron.

63. The turbine power generation system of claim 55 wherein said second field magnet is provided with a protrusion part and said first field magnet is provided with a recess part for receiving said protrusion part.

64. The turbine power generation system of claim 55 wherein an air gap between the rotor having said second field magnet and a stator is greater than that between the rotor having said first field magnet and said stator.

65. A method of controlling a magnetic field of an electric rotary machine including a rotor having a field magnet provided on a shaft, said method comprising the steps of:

providing a first field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction;

providing a second field magnet with magnetic poles of sequentially different polarities arranged in a rotational direction; and

wherein said second field magnet is rotatable on said shaft and displaced axially with respect to said first field magnet.

66. The method of claim 65 wherein a composite magnetic field created by said field magnets is changed.

67. The method of claim 65 wherein said shaft has a screw part and said second field magnet has a nut part provided on an inner peripheral side thereof.

68. The method of claim 65 further comprising a stopper provided on said shaft at a predetermined distance away from said second field magnet.

69. The method of claim 68 further comprising an actuator to vary said distance.

70. The method of claim 65 wherein an axial displacement amount of said second field magnet is detected and an advance of a current supply by a controller for controlling a converter is corrected utilizing said displacement amount.

71. The method of claim 65 further comprising a plurality of support mechanism for guiding rotational motion, reciprocating motion and composite motion.

72. The method of claim 65 wherein a sleeve is secured between an inner peripheral side of said second field magnet and the shaft.

73. The method of claim 72 wherein said sleeve is formed of a non-magnetic material having an electrical resistivity at least higher than that of iron.

74. The method of claim 65 wherein said second field magnet is provided with a protrusion part and said first field magnet is provided with a recess part for receiving said protrusion part.

75. The method of claim 65 wherein an air gap between the rotor having said second field magnet and a stator is greater than that between the rotor having said first field magnet and said stator.